

REMARKS

The Office Action of February 22, 2006 has been reviewed and the Examiner's comments carefully considered. The present Amendment amends claims 3, 10, 16 and 23 in accordance with the originally-filed specification. No new matter has been added. Accordingly, claims 1-26 remain in this application, and claims 1 and 14 are in independent form.

35 U.S.C. § 112 Rejections

Claims 1-26 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

Specifically, claims 1, 2, 14 and 15 stand rejected because the Examiner contends that the meaning of "a signal with a monotonic group delay function" is unclear. The Applicants disagree with this assertion. The term "monotonic group delay function" is a term which would be readily understood by one of ordinary skill in the art in the field of this invention. A monotonic group delay is a signal which has a ramp applied to the frequency from, for example, 1 to 100 Hz at an increasing frequency. The monotonic part means that the frequency is always increasing during the acquisition period and never reverts to a lower frequency. The signal is basically a "chirp" from 1 Hz to 100 Hz. The acquisition period is the time to acquire all of the data during the "chirp". Accordingly, the Applicants believe that the term "a signal with a monotonic group delay function" is clear from the specification and drawings as originally filed and from the above discussion. Therefore, the Applicants respectfully request that the rejection to claims 1, 2, 14 and 15 be reconsidered and withdrawn.

The Examiner has rejected claims 3 and 16 because the phrase "most preferably" renders the claims indefinite. The Applicants believe that the above amendments to claims 3 and 16 overcome the Examiner's indefiniteness rejections. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 4 and 17 stand rejected because the meaning of the term "terfenite" is unclear. Terfenite is a material sold under the trade name Terfenol-D. It is an alloy having the formula: $\text{Tb}_{0.3}\text{Dy}_{0.7}\text{Fe}_{1.9}$, and was developed in the 1950's at the Naval Ordnance

Laboratory. Terfenite has an extremely high magnetostriction of up 0.001 m/m at saturation. It sees application in magnetomechanical sensors, actuators, and acoustic and ultrasonic transducers. Accordingly, the Applicants believe that the term "terfenite" is clear from the specification and drawings as originally filed and from the above discussion. Therefore, the Applicants respectfully request that the rejection to claims 4 and 17 be reconsidered and withdrawn.

The Examiner has rejected claims 10 and 23 because the terms " $F(\omega)$ " and " $H(\omega)$ " lack antecedent basis. The Applicants believe that the above amendments to claims 10 and 23 overcome the Examiner's indefiniteness rejections. Reconsideration and withdrawal of this rejection are respectfully requested.

Regarding claims 11, 12, 24 and 25, the Examiner is unclear regarding which aspect of the signal is "ramped up". The frequency of the signal is ramped up. The Applicants believe that this feature would be readily apparent to one skilled in the art of the invention. Therefore, the Applicants respectfully request that the rejection to claims 11, 12, 24 and 25 be reconsidered and withdrawn.

Finally, claims 13 and 26 stand rejected because the Examiner contends that it is unclear what is meant by "multiplying the signal". The multiplication referred to in these claims is a multiplication of the amplitude of the signal. The purpose of such multiplication is to grow the signal from zero and then return the signal back to zero in such a way that the signal is not destroyed. This process is discussed more thoroughly at page 18, line 19 to page 19, line 13 of the Applicants' specification. Accordingly, the Applicants respectfully request that the rejection to claims 13 and 26 be reconsidered and withdrawn.

35 U.S.C. § 102 Rejections

Claims 1, 5-10, 14 and 18-23 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 5,750,884 to Field (hereinafter "the Field patent"). In view of the following remarks, the Applicants respectfully request reconsideration of this rejection.

As defined by independent claim 1, the present invention is directed to a rheometer for determining a rheological property of a sample. The rheometer includes a driver for applying an alternating movement to a surface of the sample for causing an

alternating movement of the sample; a force measuring device for providing a force signal indicative of the reaction force exerted by the sample on the driver; a displacement measuring device for providing a signal indicative of the alternating movement of the sample; a processor for receiving the force signal and the movement signal to determine the rheological property of the sample; and a signal generator for supplying to the driver a frequency sweep signal having a monotonic group delay function to cause the driver to supply the alternating movement of the sample.

As defined by independent claim 14, the present invention is also directed to a method of determining a rheological property of a sample. The method includes the steps of applying by a driver an alternating movement to a surface of the sample for causing an alternating movement of the sample; measuring a force signal indicative of a reaction force exerted by the sample; measuring a signal indicative of the alternating movement of the sample; processing the force signal and the movement signal to determine the rheological property of the sample; and supplying to the driver a frequency sweep signal having a monotonic group delay function to produce the alternating movement of the sample.

The purpose of defining the invention in terms of the monotonic group delay function is to make it clear that a ramp is applied to the frequency from, for example, 1 Hz to 100 Hz at an increasing frequency, whereas the ramping from zero to a maximum value and then back to zero relates to the amplitude of the signal.

The Field patent is directed to a viscometer (100) comprising a signal generator (111) which supplies a signal to a shaker (120). The shaker (120) drives a shaft (125) with an upper plate (130) attached to a distal end thereof. A lower plate (140) is positioned adjacent to, and substantially parallel to, the upper plate (130) thereby creating a space that may be filled by a fluidic sample (150). The motion of upper plate (130) is measured by a sensor (180). The lower plate (140) is mounted on a force measuring means (160), which provides an output signal indicative of the force that the fluid sample (150) exerts on the upper plate (130) and the lower plate (140) (see Fig. 1).

The Field patent does not teach or suggest the utilization of a monotonic group delay function as required by independent claims 1 and 14. The Examiner refers to column 6, lines 2-5 of the Field patent as discussing a frequency sweep signal having a group delay which is monotonic. However, this portion of the Field patent only refers to the waveform of

the vibration being the sum of several sinusoids with different frequencies, a sinusoid with varying frequency, single or reversing ramps, step or impulse functions, or a random function of time. There is no disclosure or suggestion in the Field patent of a monotonic group delay which is a signal having a ramp applied to the frequency at an increasing frequency wherein the frequency is always increased during the acquisition period and never reverts to a lower frequency. While the Field patent does disclose a signal generator, the nature of the signals produced by this signal generator is quite different than those of the present invention. As mentioned above, the Field patent fails to teach or suggest a signal generator that applies a signal having a monotonic group delay function.

The use of this type of signal enables very small amounts of sample to be used to enable measurements to take place. Harmonics from non-linearities are distributed in a well-defined way in the signal, rather than randomly across the frequency spectrum and, therefore, those distortions can be corrected for in the data processing by the processing means. The effect of intermittent external noise sources is confined to the frequencies during which they occurred, rather than being spread across the whole spectrum. The nature of the signal applied to the vibrating means which creates the reaction force, and therefore produces the force signal and the movement signal, enables better processing and more accurate results.

For the foregoing reasons, the Applicants believe that the subject matter of independent claims 1 and 14 is not anticipated by the Field patent. Reconsideration of the rejection of claims 14 is respectfully requested.

Claims 5-10 and 18-23 depend from and add further limitations to independent claims 1 and 14 or a subsequent dependent claim and are believed to be patentable for the reasons discussed hereinabove in connection with independent claims 1 and 14. Reconsideration of the rejection of claims 5-10 and 18-23 is respectfully requested.

35 U.S.C. § 103 Rejections

Claims 3, 11, 16 and 24 stand rejected under 35 U.S.C. § 103(a) for obviousness based upon the Field patent. In view of the following remarks, the Applicants respectfully request reconsideration of this rejection.

Claims 3, 11, 16 and 24 depend from and add further limitations to independent claims 1 and 14. The Field patent was discussed hereinabove in connection with independent claims 1 and 14. Therefore, claims 3, 11, 16 and 24 are believed to be patentable for the reasons discussed hereinabove in connection with independent claims 1 and 14. Reconsideration of the rejection of claims 3, 11, 16 and 24 is respectfully requested.

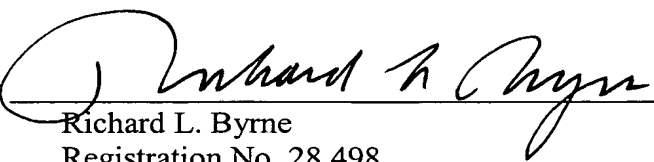
Allowable Subject Matter

The Applicants would like to thank the Examiner for indicating that claims 12 and 25 would be allowable if rewritten in independent form and to overcome the indefiniteness rejections, as discussed hereinbefore. Furthermore, the Applicants would like to note that claims 2, 4, 13, 15, 17 and 26, while rejected under 35 USC § 112, second paragraph, were not given a prior art rejection; however, the Examiner did not list these claims as allowable subject matter along with claims 12 and 25.

Based on the foregoing amendments and remarks, reconsideration of the rejections and allowance of pending claims 1-26 are respectfully requested.

Respectfully submitted,

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